Two Years Experience with Helix Atline Computer Tomography (CT) at Volkswagen Foundry Hanover
Two Years Experience with Helix Atline Computer Tomography (CT) at Volkswagen Foundry Hanover

Authors: Dr.-Ing. Raimund Rösch, Dr.-Ing. Ferdinand Hansen (L), Frank Jeltsch, Sven Körtge-Sudmann (all Volkswagen Foundry Hanover)

Content

1. New Speed\scan AtlineCT system
2. Location of AtlineCT on shop floor
3. History of Speed\scan AtlineCT at Volkswagen
4. Requirements for fast AtlineCT
5. Job modes
6. Work Schedule
7. Best part position
8. Test phantoms
9. Inspection scenario, Results and evaluations
10. Process optimization based on statistics
11. Successful and unsuccessful applications
12. Themes to optimize
13. Outlook

Dr.-Ing. R. Rösch, Dr.-Ing. F. Hansen, F. Jeltsch, S. Körtge-Sudmann (all Volkswagen Foundry Hanover)
1. New Speed|scan AtlineCT System

GE Sensing & Inspection Technologies

Manufacturer: GE Sensing & Inspection Technologies

Type: Gantry CT, based on modified GE Healthcare technology

Source: 140 kV (53 kW) dual spot, rotating anode tube

Detector: 16 lines, 912 channels

Measurement volume: approx. 300 x 400 x 800 mm

Voxel resolution: approx. 0.5 x 0.5 x 0.5 mm (typical cylinder head)
2. The new fast CT System

Location near production on shop floor area
3. History of Speed|scan AtLineCT at Volkswagen

Inspection history of AtLineCT at Volkswagen:

• installation of AtlineCT system May 2013
• start of inspections June 2013
• number of inspections 2013 6,700
• number of inspections 2014 24,400
• number of inspections 2015 until June 13,600
  in total 44,700
4. Requirements for fast AtLineCT

Features:

1. rapid testing and automatic results on main deviations
2. shorter period to production readiness for new parts
3. quicker process optimization, based on statistics
4. reduced reject rate in series
5. Job Modes for Speed|scan AtlineCT

**Function modes:**

- Rapid scanning of known serial parts with automatically evaluation, helix scan in a short sequence < 5 min

- Axial scan with manual evaluation for new parts, scan time 5 min, sequence 20 min individual evaluation
6. Work Schedule

1. Prüfteill auf Palette positionieren
2. Button „Neues Prüfteill“ drücken
3. Etikett mit Prüfnummer anfordern und drucken
4. Palette bis Gurtband schieben Etikett mit Prüfnummer auf Prüfteil kleben
5. Prüfteilbezeichnungen scannen (Data Matrix Scan)
6. Protokoll auswählen
7. „Interne Referenzmarke“ drücken
7a Palette wird eingefördert.
8. Zwei-Hand-Bedienung betätigen
8a Schieber schließt
8b Gantry Rotation wird hochgefahren.
8c Anzeige wechselt von Rot auf Weiß

Positioning of part on plate

Data input on control desk and start of scanning

Dr.-Ing. R. Rösch, Dr.-Ing. F. Hansen, F. Jeltsch, S. Körtge-Sudmann (all Volkswagen Foundry Hanover)
7. Best part position on transport system

Plate for cylinder head type A

Plate for cylinder head type B
8. Test Phantoms for NDT and Metrology Application

Tactile referencing of a test phantom (CFRP tube with 40 Al2O3 spheres)

speed\scan repeatability test

Test phantoms on plate

Test phantom on plate

Dr.-Ing. R. Rösch, Dr.-Ing. F. Hansen, F. Jeltsch, S. Körtge-Sudmann (all Volkswagen Foundry Hanover)
9. Inspection scenarios with AtLineCT at Volkswagen

Pores and shrinkages

Remainder from sand core
9. Successful ADR* evaluation of cylinder heads

Automated evaluation of deviations with VG Inline, latest version

ADR*: Automatic Deviation Recognition

Dr.-Ing. R. Rösch, Dr.-Ing. F. Hansen, F. Jeltsch, S. Körtge-Sudmann (all Volkswagen Foundry Hanover)
9. Volume Graphics evaluation of wall thickness

Automated evaluation of wall thickness
10. Process Optimization

**Process optimization for a new tilt casting method:**

1. Scanning the first poured parts
2. Automatically evaluation of main features, as pores and shrinkages, wall thickness, characteristics of the sand core and sand back-filling
3. Optimisation of process parameters
4. Verification of success in process optimisation with atline CT

3 s after start pouring

7 s after start pouring

11 s after start pouring

20 s after start pouring end position is reached

Dr.-Ing. R. Rösch, Dr.-Ing. F. Hansen, F. Jeltsch, S. Körtge-Sudmann (all Volkswagen Foundry Hanover)
10. Task preventing deformation of waterjacket

Variance approx. -2,6

VG Inline, automatically generated result

Manually generated result
10. Second correction step - no deformation of water jacket

VG Inline, automatically generated result

Manually generated result

Variance 0,0